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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,795	09/26/2003	Lee Chen	071469-0306049	7899
909	7590	07/27/2005	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN, LLP P.O. BOX 10500 MCLEAN, VA 22102			SCHILLINGER, LAURA M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/670,795

Applicant(s)

CHEN ET AL

Examiner

Laura M. Schillinger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-143 is/are pending in the application.
- 4a) Of the above claim(s) 1-92 and 120-143 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 93-119 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 93-119 are rejected under 35 U.S.C. 102(e) as being anticipated by Vaartstra ('986).

Vaartstra teaches the following claimed limitations as cited below:

93. A method of processing a layer containing a high-permittivity material, the method comprising;

modifying a layer containing a high-permittivity material (Col.3, lines: 25-40) by exposing the layer to a first process gas in a plasma (Col.5, lines: 40-50- teaching to add the non-supercritical component which is the etchant reactant (see Col.5, lines:10-25) after the substrate is exposed to the supercritical component); and

etching the modified high-permittivity layer in the absence of a plasma by exposing the layer to a second process gas comprising an etch reactant (Col.5, lines: 40-50- teaching to add the non-supercritical component which is the etchant reactant (see Col.5, lines:10-25) after the substrate is exposed to the supercritical component).

94. The method according to claim 93, wherein the layer containing a high-permittivity material overlies another layer in a substrate (Col.3, lines: 20-30).

95. The method according to claim 94, further comprising providing the substrate in a process chamber (Col.5, lines: 45-50).

96. The method as claimed in claim 93, wherein the modifying step partially removes the layer containing the high-permittivity material (Col.5, lines: 10-15- teaching that the supercritical component may be capable of etching by itself).

97. The method as claimed in claim 93, wherein the modifying step partially disassociates the layer containing the high-permittivity material (Col.5, lines: 10-15- teaching that the supercritical component may be capable of etching by itself).

98. The method according to claim 93, wherein the first process gas comprises a reactive gas (Col.5, lines: 25-40).

99. The method according to claim 96, wherein the reactive gas comprises at least one of HBr and HCl (Col.5, lines: 30-31).

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100. The method according to claim 98, wherein the first process gas further comprises an inert gas (Col.5, lines: 29-30).

101. The method according to claim 100, wherein the inert gas is selected from He, Ne, Ar (Col.5, lines: 29-30)

102. The method according to claim 93, wherein the first process gas comprises an inert gas (Col.5, lines: 29-30).

103. The method according to claim 102, wherein the inert gas comprises at least one of He, Ne, Ar,(Col.5, lines: 29-30).

104. The method according to claim 93, wherein the high- permittivity material comprises at least one of Ta<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub> (Col.3, lines: 30-40).

106. The method according to claim 93, wherein the etch reactant comprises a B-diketone (Col.6, lines: 55-60).

107. The method according to claim 106, wherein the B-diketone comprises at least one of hfacH (Col.9, lines: 65-hexafluoroacetylacetone is a hfacH).

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108. The method according to claim 107, wherein the B-diketone comprises hfacH (Col.9, lines: 65- hexafluoroacetylacetone is a hfacH).

109. The method according to claim 93, wherein the second process gas further comprises an inert gas (Col.5, lines: 29-30).

110. The method according to claim 109, wherein the inert gas comprises at least one of He, Ne, Ar (Col.5, lines: 29-30).

111. The method according to claim 93, wherein the second process gas further comprises an oxygen-containing gas (Col.6, lines: 50-55).

112. The method according to claim 111, wherein the oxygen- containing gas comprises at least one of O<sub>2</sub>, H<sub>2</sub>O (Col.6, lines: 50-55).

113. The method according to claim 95, further comprising modifying the substrate temperature at less than about 400C (Col.s 8-9, lines: 65-15).

114. The method according to claim 95, further comprising modifying the substrate temperature at less than about 200 C (Col.s 8-9, lines: 65-15).

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115. The method according to claim 93, wherein the modifying and the etching are carried out in the same process chamber (Col.5, lines: 45-50).

116. The method according to claims 93, wherein the modifying and the etching are carried out in different process chambers (Col.7, lines: 10-35).

117. The method according to claim 93, further comprising modifying a flow rate of the second process gas at less than 2000 sccm.

118. The method according to claim 106, further comprising modifying a flow rate of a p-diketone-containing carrier gas at less than 1000 sccm (Col.9, lines: 60-65).

119. The method according to claim 93, further comprising modifying a flow rate of the etch reactant at less than 1000 sccm (Col.9, lines: 60-65).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 105 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaarstra as applied to claim 104 above, and further in view of Pomerade et al ('695).

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Vaarstra teaches an etch method including etching a variety of high dielectric constant materials, however fails to explicitly teach wherein the high dielectric constant material is hafnium oxide as recited in claim 105.

However, Pomarede et al ('695) teaches that hafnium oxide is a high dielectric constant material (Col.11, lines: 15-25)

Therefore it would have been obvious to modify Vaastra's teachings to further include hafnium oxide as taught by Pomerade, since it too is a high dielectric constant material (Col.11, lines: 15-25).

#### ***Response to Arguments***

Applicant's arguments filed 4/27/05 have been fully considered but they are not persuasive. Applicant argues that Vaartstra fails to teach a first process gas; this is not persuasive- see Col.4, lines: 65-68- teaching that a supercritical fluid is a gas.

#### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37



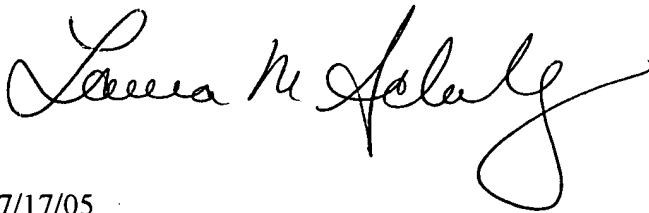
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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M. Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Laura M Schillinger  
Primary Examiner  
Art Unit 2813

07/17/05